

PLATE XLVII.

- Fig. 1. *Rhacolepis buccalis*, under aspect of head, showing ceratohyal (*ch.*),
epihyal (*eph.*), and branchiostegal rays. [28900 *a.*]
2. Ditto, tail. [P 1958 *a.*]
3. Ditto, pelvic bone. [P 1962.]
4. *Rhacolepis brama*, head, $\frac{1}{2}$ nat. size. [15490.]
5. *Rhacolepis latus*, young individual. [P 1959.]

All the specimens are preserved in the British Museum, and the numbers refer to the Register of the Geological Department. Unless otherwise stated, the figures are of the natural size.

5. Note on a Fossil Species of *Chlamydoselachus*. By JAMES
W. DAVIS, F.G.S. &c. (Communicated by Mr. A.
SMITH WOODWARD, F.Z.S.)

[Received June 7, 1887.]

Some years ago a Selachian was obtained by Prof. H. A. Ward, which had been caught off the coast of Japan. It was purchased for the Museum of Comparative Zoology at Harvard College; and in January 1884 Mr. S. Garman, of that Museum, gave a preliminary description of the fish in the 'Bulletin of the Essex Institute,' vol. xvi., in which he recognized it as belonging to a new family and instituted for it the genus *Chlamydoselachus*. A further contribution was made to 'Science' on February 1st following, in which the body is described as long and slender, compressed and thin towards the tail; five feet in length. The head is broad, slightly convex on the crown; six gill-openings are present; the nostrils are nearly vertical, with a fold dividing each orifice into two parts; eyes moderately large, without nictitating membrane. The mouth is anterior and very wide; the teeth are arranged in fifty-one rows of six each across the jaws and are all alike. "Each tooth has three slender, curved, inward-directed cusps, and a broad base, which extends back in a pair of points under the next tooth, thereby securing firmness and preventing reversion." The pectoral fins are described as of moderate size, separated by a distance of twenty-four inches from the ventrals, which, along with the anal and caudal, are large; above the anal there is a small dorsal. Mr. Garman considered that "a certain embryonic appearance in the specimen necessitated a search among the fossils for allied species. Most resemblance was found in the teeth of *Cladodus* of the Devonian; but the cusps were erect instead of reclining, and the enamel was grooved instead of smooth." After the appearance of this notice of the new fish, a considerable amount of correspondence took place in the pages of 'Science,' and diverse opinions were expressed as to the relationship of the genus to extinct forms. Prof. Cope considered that the teeth figured by Mr. Garman "show the animal to be a species of the genus *Didymodus* (= *Diplodus*, Agass.), which has hitherto been supposed to be confined to the Carboniferous and Permian periods;" and in the 'American Naturalist' of April he

confirmed his opinion at greater length, and stated that the recent fish should be named *Didymodus anguineus*. Prof. Th. Gill was disposed to consider *Chlamydoselachus* to stand "nearer the true fishes than do the Sharks proper, not because it appears to be in the line of descent between the two, but because it is nearer the primitive line from which both types have diverged." Thus far he agrees with Mr. Garman, but he dissents emphatically from him in regarding the recent acquisition as a Cladodont Shark, and agrees with Prof. Cope that *Chlamydoselachus* had a representative in the Carboniferous genus *Diplodus* or *Didymodus*, although he does not think that the two can be congeneric. He suggests the name *Pternodonta* as preferable to the one given by Mr. Garman. A month later, however, Prof. Gill withdrew his adhesion to the *Diplodus* scheme of affinity; and he says, "I am convinced not only that *Didymodus* has no generic or even family relations with *Chlamydoselachus*, but that it represents even a different order." His objection is founded on the undoubted relationship of *Diplodus* and *Pleuracanthus*, and the possession by the former of a large dorsal fin and nuchal spine, of which there is no evidence in the recent fish; and he concludes that the anatomy of the latter will probably reveal a structure most like that of the Notidanidæ, but of a somewhat more primitive type. In 'Science,' May 30th, 1884, Prof. Cope discusses the relationship of *Diplodus*, Agass., and *Didymodus*, Cope, and regarding the former as the teeth of the fish bearing *Pleuracanthus*-spines, states that it must be separated from the genus *Didymodus*, and that *Chlamydoselachus* is distinct on account of the different structure of the dorsal fin and the absence of a spine; but that hitherto no *Pleuracanthoid* spines have been found directly associated with *Didymodus* (though they are found in the same strata), and consequently, so far as we know *Chlamydoselachus*, it will not differ from *Didymodus*. These views were published in greater detail in the July 'Proceedings of the American Philosophical Society of Philadelphia.' And so matters remained until the following September, when Mr. Garman read a paper at a meeting of the American Association for the Advancement of Science, in which he strongly reiterated his views as to its relationship with the fossil *Cladodus*, with the result that both Profs. Cope and Gill abandoned their positions and accepted the views of Mr. Garman, Prof. Gill still dissenting "from the opinion that the Cladodontidæ are related to the Chlamydoselachidæ rather than the Hybodontidæ." In July 1885 Mr. Garman published a detailed description of the fish in the 'Bull. of the Museum of Comparative Zoology at Harvard College,' vol. xii. no. 1, pp. 1-35, pls. i.-xx., in which he styles it "a living species of Cladodont Shark."

Leaving this extremely problematical relationship of *Chlamydoselachus* to be substantiated or otherwise by future investigation, it is extremely interesting to find that ten years ago a fossil representative of *Chlamydoselachus* was actually discovered and figured by the late Robert Lawley. The specimen is from the Pliocene beds of Orciano in Tuscany, and is described as very rare; the teeth figured are

possessed of three sharp, slender, backwardly-curved denticles, with a base forming a broadly expanded plate divided at its posterior extremity into a pair of prongs, which doubtless extended, as in the existing species, beneath the succeeding tooth, thereby gaining additional firmness and strength. The figures indicate a tooth twice the diameter of the anterior teeth of the existing species. The author knew of no living or fossil representative of the teeth, and gave the figure with a short notice, without description or appending to it any distinctive name. There can be no hesitation therefore in associating the fossil with the existing genus, and it may not be inappropriate to append the name of Mr. Lawley and distinguish it specifically, *Chlamydoselachus lawleyi*.

The figures will be found in 'Nuovi Studi sopra ai Pesci ed altri Vertebrati fossili delle colline Toscane,' di Roberto Lawley, published at Florence in 1876, pl. i. figs. 1-1c. I am indebted to Mr. G. A. Boulenger for the opportunity of comparing them with the teeth of the recent *Chlamydoselachus* in the British Museum.

6. Contributions to the Anatomy of Earthworms.—No. IV.¹

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[Received June 23, 1887.]

IV. *Description of* CRYPTODRILUS FLETCHERI, n. sp.

Of this species, which is a native of Queensland², I have studied two specimens; one of these was fully mature with a well-developed clitellum, the other specimen was immature without any traces of a clitellum.

In the larger individual the clitellum occupied five segments, commencing with the thirteenth and ending with the seventeenth; the glandular epithelium of the clitellum extends all round the body on these segments with the exception of a ventral area on the seventeenth, corresponding to the part occupied by the ventral setæ and the space lying between them; this space was occupied by an elongated genital papilla, which is rather wider at the two extremities than in the middle. The four succeeding segments are furnished each with a similar papilla of equal size to that on the seventeenth segment and of identical appearance.

These structures closely correspond to the "dumbbell-shaped areas" described by Mr. Fletcher in another species of the same genus, *C. rusticus*; and the evident similarity lead me at first to believe that the species described here was identical with *C. rusticus*. I shall, however, have occasion in the sequel to refer to differences between the two species; and a careful comparison of Fletcher's description of *C. rusticus* with my specimen shows that in the

¹ *Ante* p. 372.

² I obtained the specimens through the kindness of Mr. S. Prout Newcombe.